



JO SCULTHORN

INDIUM

Element Symbol: **In**

Atomic Number: **49**

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Indium was discovered in Saxony, Germany, by Theodor Richter and Ferdinand Reich (1863). Richter and Reich tested zinc ores from mines in the Freiberg region of Saxony. It was known that such ores sometimes contained small quantities of the heavy metal thallium, so they were screened for thallium contamination using the characteristic green atomic emission line. No green line was observed but an unprecedented and exciting bright indigo line was. They named the new element indium after the colour of its emission.

The group 13 element indium exists in very few minerals, e.g. dzhindite ($\text{In}(\text{OH})_3$) and indite (FeIn_2S_4). These sources are not abundant enough for widespread application of indium. Instead, indium is sourced for industry as a minor-component of the tailings when mining other more abundant metals. The greatest resource of indium is zinc ore deposits, with lesser quantities available from iron, copper, tin and lead ores. The overall abundance of indium in the Earth's crust is 0.25ppm and it is widely believed that there is 16,000 tonnes of economically viable indium available. Based on current usage, some have predicted exhaustion of readily accessible indium by 2020 unless increased manufacturing efficiency and recycling are adopted.

Indium is a relatively soft, malleable and non-toxic metal. Its first application was in World War II as a thin film lubricant coating for bearings in high performance aircraft engines. Post war, electronic applications of indium grew at a sensational pace. Noteworthy landmarks are its application in PNP transistors (1950s), the development of III/V semiconductors such as indium phosphide (LEDs and laser diodes, 1980s), indium tin oxide and indium oxide as transparent conductive glass coatings for electroluminescent panels (smart phones, GMS road maps, PDRs 1990s to present), and copper indium gallium selenide for thin film solar cells (present day). Lesser known applications include the use of ^{111}In in medical imaging and the application of indium's high neutron capture cross-section in nuclear reactor control rods.

Australia has large deposits of zinc ore. One of the most recently developed is the Abra deposit in central Western Australia. This has emerged as a major source of Proterozoic base metals like lead, silver, zinc, copper and gold. Several of these elements are known to be accompanied by indium. Based on increasing recovery yields during extraction, new mining investments such as Abra and recycling, the long-term supply of indium should be sufficient to sustain its current and future demands.

Provided by the element sponsor Marcus Cole

ARTISTS DESCRIPTION

The bottles in this print represent Indium supplements which are available in liquid or tablet form for human consumption. There is a great debate regarding Indium and human health. In some circles it is hailed as a miracle dietary supplement with multiple claims of beneficial therapeutic results. Scientific literature, however, does not support these testimonials.

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